We claim:

1. A substantially purified plant proanthocyanidin extract, wherein said extract is capable of inhibiting agglutination of P-type *E. coli* and not capable of inhibiting agglutination of type 1 *E. coli*.

2. The extract of Claim 1, wherein said extract is substantially free of anthocyanins, flavonols, hydrolyzable tannins, alkaloids, lipids, carbohydrates, simple sugars, protein and amino acids, alcohols and organic acids.

3. The extract of Claim 1, wherein said plant extract is from a plant in the family Ericaceae, Rosaceae, Pinaceae or Vitaceae.

4. The extract of Claim 3, wherein said plant is from the family Ericaceae.

5. The extract of Claim 4, wherein said plant is a *Vaccinium* species.

6. The extract of Claim 5, wherein said Vaccinium species is selected from the group consisting of *Vaccinium macrocarpon, Vaccinium vitis-idaea, Vaccinium oxycoccus, Vaccinium augustifolium, Vaccinium ashei, Vaccinium corymbosum, Vaccinium lamarckii* and *Vaccinium myrtillus*.

7. The extract of Claim 5, wherein said *Vaccinium* species is *Vaccinium macrocarpon*.

8. The extract of Claim 3, wherein said plant is from the family Vitaceae.

9. The extract of Claim 8, wherein said plant is a *Vitis* species.

10. The extract of Claim 9, wherein said *Vitis* species is selected from the group consisting of *Vitis labrusca, Vitis rotunddifolia* and *Vitis vinifera*.

11. The extract of Claim 7, wherein said extract comprises one or more proanthocyanidin compounds comprising two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units.

12. The extract of Claim 11, wherein said compounds consist of an average of from at least four to about seven epicatechin flavanoid monomer units.

13. The extract of Claim 12, wherein said compounds consist of an average of four, five or six epicatechin flavanoid units.

14. The extract of Claim 7, wherein said extract comprises proanthocyanidin compounds consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units.

15. The extract of Claim 14, wherein said compounds consist of an average of from five to eight epicatechin flavanoid units.

16. A proanthocyanidin composition comprising one or more proanthocyanidin compounds having an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units.

17. The composition of Claim 16 wherein said compound has an average of from five to eight epicatechin flavanoid units.

18. A proanthocyanidin composition comprising one or more proanthocyanidin compounds having an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units.

19. The composition of Claim 18, wherein said compounds consist of an average of four, five or six epicatechin flavanoid units.

20. A method of preparing a proanthocyanidin extract from a plant which comprises:

(a) homogenizing plant material in an aqueous extraction solvent comprising at least about 10% water but no more than about 30% water, about 10% to about 70% acetone, about 5% to about 60% methanol and about 0.05% to about 1% ascorbic acid to prepare a first extract;

(b) subjecting said first extract to further purification;

(c) recovering a substantially purified proanthocyanidin extract, wherein said extract is capable of inhibiting agglutination of P-type *E. coli* and not capable of inhibiting agglutination of type 1 *E. coli*.

21. The method of Claim 20, wherein said plant material is from a plant in the family Ericaceae, Rosaceae, Pinaceae or Vitaceae.

22. The method of Claim 21, wherein said plant material is from a plant in the family Ericaceae.

23. The method of Claim 22, wherein said plant is a *Vaccinium* species.

24. The method of Claim 23, wherein said Vaccinium species is selected from the group consisting of *Vaccinium macrocarpon, Vaccinium vitis-idaea, Vaccinium oxycoccus, Vaccinium augustifolium, Vaccinium ashei, Vaccinium corymbosum, Vaccinium lamarckii* and *Vaccinium myrtillus.*

25. The method of Claim 23, wherein said *Vaccinium* species is *Vaccinium macrocarpon.*

26. The method of Claim 21, wherein said plant is from the family Vitaceae.

27. The method of Claim 26 wherein said plant is a *Vitis* species.

28. The method of Claim 27, wherein said *Vitis* species is selected from the group consisting of *Vitis labrusca, Vitis rotunddifolia* and *Vitis vinifera.*

29. The method of Claim 20, wherein said plant material is from leaves, mature fruit, immature fruit, stems or roots.

30. The method of Claim 29, wherein said plant material is from leaves.

31. The method of any one of Claims 20-30, wherein said aqueous extraction solvent comprises about 40% acetone, about 40% methanol and about 0.1% ascorbic acid.

32. In a method of isolating proanthocyanidins from plant material which comprises homogenizing said plant material with an extraction solvent to obtain a first extract, and subjecting said first extract to further purification steps to obtain a proanthocyanidin extract, the improvement which comprises homogenizing said plant material in an aqueous extraction solvent comprising at least about 10% water but no more than about 30% water, about 10% to about 70% acetone, about 5% to about 60% methanol and about 0.05% to about 0.2% ascorbic acid to obtain said first extract.

33. The method of Claim 32, wherein said plant material is from a plant in the family Ericaceae, Rosaceae, Pinaceae or Vitaceae.

34. The method of Claim 33, wherein said plant material is from a plant in the family Ericaceae.

35. The method of Claim 34, wherein said plant is a *Vaccinium* species.

36. The method of Claim 35, wherein said Vaccinium species is selected from the group consisting of *Vaccinium macrocarpon, Vaccinium vitis-idaea, Vaccinium oxycoccus, Vaccinium augustifolium, Vaccinium ashei, Vaccinium corymbosum, Vaccinium lamarckii* and *Vaccinium myrtillus.*

37. The method of Claim 35, wherein said *Vaccinium* species is *Vaccinium macrocarpon.*

38. The method of Claim 33, wherein said plant is from the family Vitaceae.

39. The method of Claim 38, wherein said plant is a *Vitis* species.

40. The method of Claim 39, wherein said *Vitis* species is selected from the group consisting of *Vitis labrusca, Vitis rotunddifolia* and *Vitis vinifera.*

41. The method of any one of Claims 32-40, wherein said aqueous extraction solvent comprises about 40% acetone, about 40% methanol and about 0.1% ascorbic acid.

42. A method of preparing a proanthocyanidin extract from a *Vaccinium* species which comprises:

(a) homogenizing *Vaccinium* plant material in an aqueous extraction solvent comprising at least about 10% water but no more than about 30% water, about 10% to about 70% acetone, about 5% to about 60% methanol and about 0.05% to about 0.2% ascorbic acid to prepare a first extract;

(b) clarifying said first extract and obtaining a supernatant fraction therefrom;

(c) removing solvent from said supernatant fraction to obtain a residue and suspending said residue in distilled water to obtain an aqueous residue solution;

(d) subjecting said aqueous residue solution to further purification by either

(i) applying said aqueous residue solution to reverse-phase lipophilic chromatography material equilibrated in distilled water and successively washing said lipophilic chromatography material with a sufficient amount of distilled water to remove sugars, a sufficient amount of about 15% aqueous methanol to remove acids and a sufficient amount of 100% acidified methanol to elute polyphenolic compounds, and then removing solvent from said polyphenolic compounds to obtain a first dried fraction, or

(ii) extracting said aqueous residue solution with a non-polar extraction solvent, recovering the aqueous phase thereof and removing solvent from said aqueous phase to obtain a second dried fraction;

(e) suspending said first or second dried fraction in about 50% aqueous ethanol to obtain an ethanol solution, applying said ethanol solution to mixed hydrophilic-lipophilic chromatography material equilibrated in about 50% aqueous ethanol, and washing said mixed hydrophilic-lipophilic chromatography material with an amount of about 50% aqueous ethanol sufficient to remove non-proanthocyanidin polyphenolic compounds; and

(f) eluting said hydrophilic-lipophilic chromatography material with an amount of about 70% aqueous acetone sufficient to obtain said proanthocyanidin extract.

43. The method of Claim 42, wherein said *Vaccinium* plant material is from *Vaccinium macrocarpon*.

44. The method of Claim 42, wherein said plant material is from leaves, mature fruit, immature fruit, stems or roots.

45. The method of Claim 43, wherein said plant material is from leaves.

46. The method of Claim 42, wherein said aqueous extraction solvent comprises about 40% acetone, about 40% methanol and about 0.1% ascorbic acid.

47. The method of Claim 43, wherein said aqueous extraction solvent comprises about 40% acetone, about 40% methanol and about 0.1% ascorbic acid.

48. A proanthocyanidin extract prepared by the method of any one of Claims 20-30, 32-40 or 42-47.

49. A proanthocyanidin extract prepared by the method of Claim 31.

50. A proanthocyanidin extract prepared by the method of Claim 41.

51. A pharmaceutical composition comprising the proanthocyanidin extract of any one of Claims 1 to 15 and a pharmaceutically acceptable carrier.

52. A pharmaceutical composition comprising the proanthocyanidin composition of any one of Claims 16-19 and a pharmaceutically acceptable carrier.

53. A pharmaceutical composition comprising the proanthocyanidin extract of Claim 48 and a pharmaceutically acceptable carrier.

54. A pharmaceutical composition comprising the proanthocyanidin extract of Claim 49 and a pharmaceutically acceptable carrier.

55. A pharmaceutical composition comprising the proanthocyanidin extract of Claim 50 and a pharmaceutically acceptable carrier.

56. A method of preventing or treating a urogenital infection in a mammal which comprises administering a pharmaceutical composition to said mammal in an amount and for a time sufficient to prevent, reduce or eliminate symptoms associated with said infection, wherein said pharmaceutical composition comprises a pharmaceutically-acceptable carrier in admixture with one or more

(a) substantially purified plant proanthocyanidin extracts capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*;

(b) proanthocyanidin compounds capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*, wherein said polymer comprises two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(c) proanthocyanidin compounds consisting of an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units

are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(d) proanthocyanidin compounds consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units or

(e) proanthocyanidin polymers capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli.*

57. The method of Claim 56, wherein said mammal is a cat or a dog.

58. The method of Claim 56, wherein said mammal is a human.

59. The method of claim 56, wherein said urogenital infection is a bladder infection or a kidney infection.

60. The method of Claim 59, wherein said kidney infection is pyelonephritis.

61. A food composition comprising a consumable carrier in admixture with one or more

(a) substantially purified plant proanthocyanidin extracts capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*;

(b) proanthocyanidin compounds capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*, wherein said polymer comprises two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(c) proanthocyanidin compounds consisting of an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and

C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(d) proanthocyanidin compounds consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units; or

(e) proanthocyanidin polymers capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*.

62. The food composition of claim 61 wherein said consumable carrier is livestock feed.

63. A method of preventing or treating a urogenital infection in a livestock animal which comprises administering the food composition of Claim 62 to said animal in an amount and for a time to prevent, reduce or eliminate symptoms associated with said infection.

64. A method of reducing the pathogenicity of P-type *E. coli* in the digestive tracts of an animal which comprises administering the food composition of Claim 62 to said cattle for a time and in an amount to reduce the detectable number of P-type *E. coli* bacterial cells in the feces or urine of said animal.

65. The method of Claim 64, wherein said animal is a cow, a steer, a calf, a pig, a lamb, a chicken or a turkey.

66. A method of reducing P-type *E. coli* contamination in ground meat which comprises:

(a) obtaining raw meat from an animal; and

(b) adding the food composition of Claim 61 to said raw meat; and

(c) preparing ground meat from said raw meat.

67. The method of Claim 66 wherein said composition is added to said raw meat before or during preparation of said ground meat.

68. A method of reducing P-type *E. coli* contamination in ground meat which comprises:

(a) obtaining raw meat from an animal; and

(b) adding to said raw meat one or more

(i) substantially purified plant proanthocyanidin extracts capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*;

(ii) proanthocyanidin compounds capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*, wherein said polymer comprises two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(iii) proanthocyanidin compounds consisting of an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(iv) proanthocyanidin compounds consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units; or

(v) proanthocyanidin polymers capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*.

(c) preparing ground meat from said raw meat.

69. The method of Claim 68 wherein said composition is added to said raw meat before or during preparation of said ground meat.

70. A method of reducing P-type *E. coli* contamination in ground meat which comprises:

(a) feeding the food composition of Claim 62 to a livestock animal;

(b) obtaining raw meat from said animal; and

(c) preparing a ground meat from said raw meat.

71. The method of Claim 70, wherein said ground meat is prepared using a proportion of said raw meat sufficient, when detected by an agglutination assay, to reduce the agglutination of *E. coli* microorganisms in said ground meat relative to ground meat prepared only from raw meat of a similar livestock animal who has not been fed said feed composition.

72. The food composition of Claim 61 wherein said consumable carrier is domestic animal feed.

73. A method of preventing or treating a urogenital infection in a domesticated animal which comprises administering the food composition of Claim 72 to said animal in an amount and for a time to prevent, reduce or eliminate symptoms associated with said infection.

74. The method of Claim 73, wherein said animal is a cat or a dog.

75. The food composition of Claim 61 wherein said consumable carrier is a consumable food product.

76. The composition of Claim 75, wherein said consumable food product is a cranberry-containing food product.

77. The composition of Claim 76, wherein said cranberry-containing food product is a dried cranberry, a sweetened and dried cranberry, a flavored fruit piece, a sauce, a jelly, a relish, juice, wine or a cranberry juice-containing product.

78. The composition of Claim 75, wherein said consumable food product is a beverage.

79. The composition of Claim 78, wherein said beverage comprises cranberry juice, unpasteurized juice or pasteurized juice.

80. The food composition of Claim 75 wherein said consumable food product is ground meat.

81. A method of preventing or treating a urogenital infection in a human which comprises administering a food composition of any one of Claims 75-80 to said human in an amount and for a time to prevent, reduce or eliminate symptoms associated with said infection.

82. A method of preventing or treating diarrhea in a mammal which comprises administering a pharmaceutical composition to said mammal in an amount and for a time sufficient to prevent, reduce or eliminate symptoms associated with said diarrhea, wherein said pharmaceutical composition comprises a pharmaceutically-acceptable carrier in admixture with one or more

(a) substantially purified plant proanthocyanidin extracts capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*;

(b) proanthocyanidin compounds capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*, wherein said polymer comprises two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(c) proanthocyanidin compounds consisting of an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(d) proanthocyanidin compounds consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units; or

(e) proanthocyanidin polymers capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*.

83. The method of Claim 82, wherein said mammal is a cat or a dog.

84. The method of Claim 82, wherein said mammal is a human.

85. A method of inhibiting adherence of P-type *E. coli* to a surface which comprises contacting said bacteria with at least one proanthocyanidin extract,

compound or polymer, prior to or concurrently with contacting said bacteria with said surface, wherein said proanthocyanidin extract, compound or polymer is selected from the group consisting of

(a) a substantially purified plant proanthocyanidin extract capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*;

(b) a proanthocyanidin compound capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*, wherein said polymer comprises two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(c) a proanthocyanidin compound consisting of an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(d) a proanthocyanidin compound consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units; or

(e) a proanthocyanidin polymer capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*.

86. The method of Claim 85, wherein said surface is a uroepithelial cell surface or biofilm.

87. A method of reducing the incidence of infection after surgery, treating topical wounds or acne, or preventing or eliminating oral infection which comprises administering a pharmaceutical composition to a site of infection or potential

infection in a patient, wherein said pharmaceutical composition comprises a pharmaceutically-acceptable carrier in admixture with one or more

(a) substantially purified plant proanthocyanidin extracts capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*;

(b) proanthocyanidin compounds capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*, wherein said polymer comprises two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(c) proanthocyanidin compounds consisting of an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(d) proanthocyanidin compounds consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units; or

(e) proanthocyanidin polymers capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*.

88. A method of detecting P-type reactive bacteria in a body fluid sample which comprises

(a) contacting said body fluid sample with a P-type receptor-specific assay reagent and for a time and in an amount to allow binding of any P-type reactive bacteria present in said sample to said reagent, wherein said reagent comprises a solid-phase substrate coated with one or more proanthocyanidin extracts, compounds or polymers selected from the group consisting of

(i) substantially purified plant proanthocyanidin extracts capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*;

(ii) proanthocyanidin compounds capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*, wherein said polymer comprises two or more flavanoid monomer units wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of any units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(iii) proanthocyanidin compounds consisting of an average of from at least four to about seven epicatechin flavanoid units, wherein at least two of said units are linked together by an A-type interflavanoid linkage by bonds between C4 and C8 and between the C2 and the oxygen of C7 of the units and the remainder of the units are linked to each other by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units;

(iv) proanthocyanidin compounds consisting of an average of from at least four to about twelve epicatechin flavanoid units, wherein each unit is linked to the next by a B-type interflavanoid bond between C4 and C8 or between C4 and C6 of the units; or

(v) proanthocyanidin polymers capable of inhibiting agglutination of P-type *E. coli* but incapable of inhibiting agglutination of type 1 *E. coli*.

(b) determining whether P-type reactive bacteria are present in said sample by assessing the degree of agglutination is said sample.

89. The method of Claim 88, wherein said plant extract is from a *Vaccinium* species.

90. The extract of Claim 89, wherein said *Vaccinium* species is *Vaccinium macrocarpon*.